PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 30990053 WO	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/GB 00/ 00489	International filing date *(day/month/year)* 15/02/2000	(Earliest) Priority Date *(day/month/year)* 16/02/1999
Applicant HEWLETT-PACKARD COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

□ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

□ contained in the international application in written form.

□ filed together with the international application in computer readable form.

□ furnished subsequently to this Authority in written form.

□ furnished subsequently to this Authority in computer readble form.

□ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

□ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. □ **Certain claims were found unsearchable** (See Box I).

3. □ **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

□ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

Similarity searching by combination of different data-types

5. With regard to the **abstract,**

☒ the text is approved as submitted by the applicant.

□ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

□ because the applicant failed to suggest a figure.

□ because this figure better characterizes the invention.

□ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
CT/GB 00/00489

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 08 265 A (RICOH KK) 4 September 1997 (1997-09-04) column 1, line 49 - line 56 column 2, line 8 - line 11 column 2, line 51 - line 61 column 5, line 15 - line 56 figures 3,4 ---	1-6, 14-17

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search 14 June 2000	Date of mailing of the international search report 03/07/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Triest, J

2

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	MUKHERJEA S ET AL: "Towards a multimedia World-Wide Web information retrieval engine" COMPUTER NETWORKS AND ISDN SYSTEMS,NL,NORTH HOLLAND PUBLISHING. AMSTERDAM, vol. 29, no. 8-13, 1 September 1997 (1997-09-01), pages 1181-1191, XP004095315 ISSN: 0169-7552 column 2, line 12 -column 3, line 3 ---	1,2,4,5
A	HAMANO T: "A SIMILARITY RETRIEVAL METHOD FOR IMAGE DATABASES USING SIMPLE GRAPHICS" PROCEEDINGS OF WORKSHOP ON LANGUAGES FOR AUTOMATION,US,WASHINGTON, IEEE COMP. SOC. PRESS, vol. -, 1988, pages 149-154, XP000118740 ISBN: 0-8186-0890-0 page 150, column 2, paragraph 4 -page 151, column 1, paragraph 3 -----	14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/00489

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19708265 A	04-09-1997	US 5933823 A	03-08-1999
		CN 1170168 A	14-01-1998
		JP 9237282 A	09-09-1997

PATENT COOPERATION TREATY

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IPC 7 G06F

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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"&" document member of the same patent family

Date of the actual completion of the international search 14 June 2000	Date of mailing of the international search report 03/07/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Triest, J

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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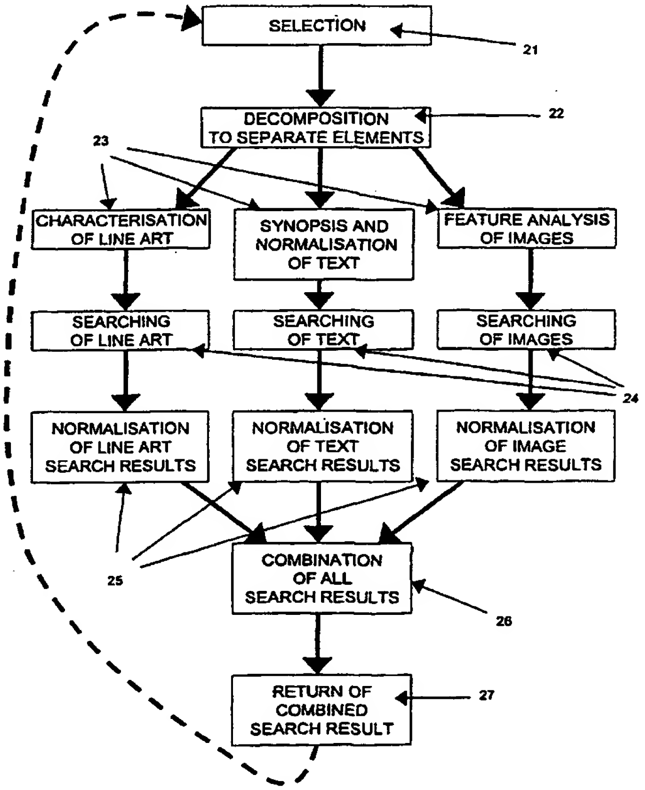
(54) Title: SIMILARITY SEARCHING BY COMBINATION OF DIFFERENT DATA-TYPES

(57) Abstract

This invention relates to managing multiple web servers, a web service system and method that allows a system operator to distribute content to each web server in the web service system and notifying a computer, such as a cache server, of content changes. In one embodiment, a method for notifying a computer of changed files includes identifying changes in a source file set, storing the identified changes in a modification list and transmitting the modification list to a computer. In one embodiment, a method for replicating changes in a source file set on a destination file system and for notifying a computer of the changes includes identifying changes in a source file set, storing the changes in a first modification list, and transmitting the first modification list to an agent having access to a destination file system.


SELECTION
21
DECOMPOSITION TO SEPARATE ELEMENTS
22
23
CHARACTERISATION OF LINE ART
SYNOPSIS AND NORMALISATION OF TEXT
FEATURE ANALYSIS OF IMAGES
SEARCHING OF LINE ART
SEARCHING OF TEXT
SEARCHING OF IMAGES
24
NORMALISATION OF LINE ART SEARCH RESULTS
NORMALISATION OF TEXT SEARCH RESULTS
NORMALISATION OF IMAGE SEARCH RESULTS
25
COMBINATION OF ALL SEARCH RESULTS
26
RETURN OF COMBINED SEARCH RESULT
27

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CU	Cuba
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GH	Ghana
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IL	Israel
IS	Iceland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakstan
LC	Saint Lucia
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
MK	The former Yugoslav Republic of Macedonia
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
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SD	Sudan
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SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TM	Turkmenistan
TR	Turkey
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam
YU	Yugoslavia
ZW	Zimbabwe

Similarity searching by combination of different data-types

Field of Invention

The present invention relates to a method and means for searching to find similar documents in response to a query. The invention is particularly relevant to the use of one document as a query for a search to obtain similar documents.

Description of Prior Art

Similarity searching in databases of electronically stored documents is an important area of practical application. Such searching is well known for text. Typically, the input for such searching would be a text string, and the engine would then search the database matching entries against the text string and return entries with an acceptable similarity threshold. Similar searching is available for images - an example is the IBM Corporation QBIC (Query by Image Content) package, described at and available from http://wwwqbic.almaden.ibm.com/.

Research has also been done on using structural analysis of a document in searching, particularly at the German Research Center for Artificial Intelligence GmbH (DFKI) in systems such as Office Maid and SALT. These systems are further described at http://www.dfki.uni-kl.de.

Existing techniques are effective when the query is of essentially one data type: a text string only, or an image only. In general, however, an electronic document will consist of a combination a number of data types: a typical document might contain one or more text passages, one or more images, and line art. The text passages may also be readily sub-dividable into different types, such as headings, legends, and bulk text. Using existing techniques as indicated above, similarity searching will involve extraction of one element in a particular data type followed by similarity searching appropriate to that data type.

An example of such a sequential approach is found in US Patent No. 6,002,798. This provides for an initial structural analysis of a document into areas of different type: not simply into image plus text, but also into areas of different functional significance (eg title, heading, text block). This structural information is then used to allow user searching and text indexing in chosen functional elements of the document. This mechanism is particularly useful for making the problem of text searching in complex documents more tractable - it is not, however, effective to allow searching for documents which are as a whole similar to a query document.

It is desirable to provide methods of similarity searching which allow the features of the document to be used appropriately in a search that is properly representative of the full document.

Summary of Invention

Accordingly, in a first aspect the invention provides method of searching a database to find documents similar to a query document, comprising: decomposing the query document into elements of different data types; for one or more of the elements in a first data type, conducting a first data type similarity search to return match results from the database for the one or more elements in the first data type; for one or more of the elements in a second data type, conducting a second data type similarity search to return match results from the database for the one or more elements in the second data type; combining the match results from the first data type similarity search and the second data type similarity search to provide query document match results.

Advantageously, results from each query document match may be combined to allow progressive refinement of queries using any of the data types either singly or in further combination.

In a second aspect, the invention provides a method of searching a database to find documents similar to a query document, comprising: decomposing the query document into elements of different data types; determining a layout element in a layout datatype from the spatial arrangement of the elements in the document; for the layout element, conducting a layout similarity search to return match results from the database for the layout element.

Brief Description of Figures

Specific embodiments of the invention are described below, by way of example, with reference to the accompanying drawings, of which:

Figure 1 shows a typical document page containing different data types;

Figure 2 shows steps in a method according to an embodiment of a first aspect of the invention for conducting a similarity search for the document shown in Figure 1;

Figure 3 shows the representation of the document shown in Figure 1 as a layout of datatypes, and indicates a search step usable in a further embodiment of the method of the invention; and

Figure 4 shows steps in a method according to an embodiment of the second aspect of the invention for conducting a similarity search for layout information.

Description of Embodiments

A typical document contains a plurality of data types. The most basic data types are text and images. Document 1 shown in Figure 1 contains a text block 12 - this text block is data in a first data type. Document 1 also contains two different kinds of image. One kind, image block 13, is a photographic image, typically consisting of an array of pixels in which each pixel has a colour value. The other kind, line art block 11, is also an image but a "drawn" one, readily representable as a combination of geometric or formulaic elements - and as such, typically readily scalable. Photographic images and line art images (hereafter "pictures" and "graphics") respond differently to different image processing and analysis techniques, and are most effectively treated as different data types. Moreover, pictures and graphics will generally serve a different purpose in a document, so it is also practical for the purpose of similarity searching to treat pictures and graphics separately.

The steps involved in similarity searching for the document of Figure 1 according to an embodiment of the first aspect of the invention are shown in Figure 2.

Firstly the document 1 is selected in step 21. For an electronic document, this could be achieved through any appropriate application capable of supporting the file type or file types of the document. For a physical document, this could be achieved by scanning the document using a scanner.

Secondly in step 22, the document is decomposed into separate elements: in the case of document 1, these elements are graphic block 11, text block 12, and picture block 13. In the case of text block 12, it is desirable for optical character recognition to be carried out at this point so that the text block element resulting from decomposition consists of ASCII text. Decomposition of the document is achieved by an analysis and recognition process through which the different parts of the document are recognised as being text, pictures or graphics. Decomposition of a document into separate data types in this way is known, using for example techniques identified in "Block Segmentation and Text Extraction in Mixed Text/Image Documents" by FM Wahl, KY Wong and RG Casey, Computer Graphics and Image Processing, Vol. 20 (1982) (a further example is provided in US Patent No. 6,002,798). Software adapted for use with proprietary scanners to decompose the elements of a scanned page into separate data types (in order to optimise the scanning process for each data type) is provided by Hewlett-Packard Company as "HP PrecisionScan". The output of HP PrecisionScan is a set of elements each in a single data type, each of which can be selected for further processing.

The result of decomposition is a set of elements, each element having a single data type. For a particular data type, such as text, then either all text is determined to be part of a single element, or else physically distinct areas of text are considered as separate elements, depending on how the decomposition is carried out. In one version of the embodiment all the elements of the document are used in similarity searching: in other versions one or more of the elements are selected for use in similarity searching (or the user is even allowed an opportunity to select part of an element for such further processing).

Separate elements are then used in similarity searching 23, 24 against a database, for example a database representing content available on the World Wide Web. Should all the elements be of one data type, this reduces to a conventional similarity searching problem addressable with a single search engine for the relevant data type. However, if elements are of different data types, then separate search engines are used for each data type. Appropriate search engines for similarity searching for different data types are known. For example, for text, appropriate linguistic matching toolkits are available from Teragram Corporation (http://www.teragram.com) and Inxight Software, Inc. (http://www.inxight.com/). In each case an appropriate preconditioning step 23 is desirable before the matching step 24, as will be discussed briefly in relation to the main data types below.

For example, Inxight Summarizer is a software component technology that summarises a document by extracting key sentences from the document. This is the preconditioning step 23. These summaries can then be matched against each other in the matching step 24. Inxight Summarizer generates indicative summaries that contain key sentence. elements from a document.The essence of the text isextractedby stemming and text normalisation technology to obtain a concise and canonical synopsis of the text. "Stemming" is the replacement of a word by its root and part-of-speech (e.g. “I had wanted” -> “to want/first person/pluperfect”), whereas "normalisation" involves replacement of one of several forms with a “concept” (e.g. “2/3/99, Feb 2nd,1999 and 2nd February” are all alternate forms of the same concept). The matching step 24 can then be carried out on the stemmed and normalised results of the preconditioning step 23 with confidence that text content which is genuinely similar will be matched without adverse influence from unwanted syntax considerations.

An example of an image searching tool is the IBM QBIC package, as indicated above. QBIC is further described at http://wwwqbic.almaden.ibm.com/. This package is adapted to precondition the images by analysing for a number of different criteria, such as colour percentages, colour layout, and textures occurring in the images. These criteria are then used in combination in a matching step 24. There are many other known applications of "searching a 'new' image for known objects, from robot vision (a robot searching for parts in a bin), through to traffic monitoring systems (automatic detection of car license plates) - the present matching problem is essentially the inverse of these known problems.

It can be appreciated also that a serial approach could be used effectively: for example, first using a "straight edge" histogram to enable differentiation between natural and artificial scenes; then using an "edge length" histogram (an shortage of long edges probably indicates a natural scene); testing for a large area of blue tone at the top of the image (indicating an outdoor scene); and testing for significant elements of flesh tones", indicating that there is an image containing representations of people - which can be followed by a face matching analysis to find the same faces. Clearly a combination of serial and parallel steps can be employed.

The result of the similarity searching is a set of series of matching scores for documents in the database, such a set existing for each element searched. Each of these search scores needs to be normalised 25 for combination 26 to achieve a combined search result 27. The normalisation step 25 is to ensure that a correct balance is given to the results of the different searching steps 24. This can either be to weight each element of the document equally, to weight each element of the document according to its perceived importance in the document, or according to a user assessment of the relative importance of the different elements of the document.

A preferred solution may involve a mixture of automatic and manual weighting. A particularly effective approach is to use synopsis generation techniques on the textual part to produce a set of textual search criteria and also to present a set of possible criteria based on the non-textual parts. These criteria are then presented to the user for verification. Such a user based approach is easy to use (and it is also easy for a user to tell when it is ineffective). For example, auser may be asked if he/she wanted to search for things that matched the textual synopses, or, for the image and drawing parts, whether he wanted "this person", "scenes like this", "pictures containing this object"... or "pages that look like this one".

The combined result 27 is as for conventional similarity searching: a series of matching scores (generally expressed as percentages) listing documents in the database from best towards worst matches.

Generally, most effective user querying will be achieved where it is possible for the user to achieve successive refinement of the user query - using the results of one round of querying as a basis for constructing the next round of querying - so in practice the combined result 27 will frequently be fed back to a later selection step to allow effective iterative searching.

Further use can be made of information derived from page decomposition in similarity searching. In addition to the separate elements provided by page decomposition (graphic 11, text block 12, and picture 13), further information is provided in the arrangement of the different elements within the document. As is shown in Figure 3, a further output available from page decomposition is a data type plan 31 representing the document as a line art block, a text block, and an image block, arranged vertically in sequence - decomposition into layouts is discussed is US Patent No. 6,002,798. However, the present inventors have appreciated that this data type plan can itself be used as a layout data type. This allows yet another element - the layout data type element - to be used in searching 32 of a database (provided that layout information is available in or derivable from the database entries). The results of similarity searching for such a layout element can be combined with similarity searches for other elements exactly as described in Figure 2., with layout data type 31 emerging from the decomposition step 22 and then being used in a searching step 32 equivalent and parallel to searching steps 23 and 24 (followed by a normalisation step before combination in step 26 with results from other data types.

In an embodiment according to the second aspect of the invention, similarity searching is conducted using the layout data type alone. The steps to be followed are essentially as in conventional similarity searching - this is shown in Figure 4, with elements common to the first aspect of the invention given the same reference numbers as in Figure 2. Layout similarity searching, whether used on its own or as one of the elements in a combined search as described in the first aspect of the invention, is more powerful if a number of different data types are used for text and for overall document type. Using a rule-based approach, different text blocks and whole documents, especially in the case of formal workflow documents, can be assigned particular functions with relatively high confidence. For example, it is well known that isolated text blocks at the top of a page and handwriting at the bottom are suggestive of a letter, and so different spatial regions of the document can be assigned to appropriate functional fields (address, letter text etc) - likewise, table and currency totals in a document can be identified as a discrete element, and their presence limits the document to another group (bill, quote or invoice). Layout searching can thus involve matching to templates representing different workflow document types (thus promoting matching of a document determined to be a letter against other letters). An appropriate mechanism is to normalise a layout for size, orientation and skew, and then carrying out an "exclusive or" operation on the query element and the layout records in the database - this will be effective provided that all records involved have a broadly common format.

The difficulty of this problem depends on the nature and type of documents that are to be considered for matching. If the "universe" of documents is well defined, then there are tools available that can do an accurate job of classifying and labelling within that universe (e.g. OfficeMaid from DFKI). What is required in this case is classification according to a set of conventions laid down for the various classes of documents available for consideration. Conventions are here essentially rules that need not be closely followed: consequently an appropriate approach to this problem is rule based (most conveniently using fuzzy rules). Training of a neural network would also be an effective approach to adopt. The skilled person will appreciate how conventional fuzzy rule or neural network approaches could be adapted for use in a solution to this problem.

The skilled man will appreciate that modifications of the embodiments described above can readily be carried out without departing from the invention as defined in the claims.

CLAIMS

1. A method of searching a database to find documents similar to a query document, comprising:

decomposing the query document into elements of different data types;

for one or more of the elements in a first data type, conducting a first data type similarity search to return match results from the database for the one or more elements in the first data type;

for one or more of the elements in a second data type, conducting a second data type similarity search to return match results from the database for the one or more elements in the first data type;

combining the match results from the first data type similarity search and the second data type similarity search to provide query document match results.

2. A method as claimed in claim 1, wherein one of the data types is representative of text.

3. A method as claimed in claim 2, wherein a plurality of the data types are representative of text, separate data types of the plurality being representative of different functional blocks of text.

4. A method as claimed in any preceding claim, wherein one of the data types is representative of pictorial images.

5. A method as claimed in any preceding claim, wherein one of the data types is representative of graphical images.

6. A method as claimed in any preceding claim, wherein one of the data types is representative of the arrangement of other data types within the document.

7. A method as claimed in any preceding claim, wherein the step of similarity searching to return match results is carried out, separately, for a plurality of elements having between them more than two data types.

8. A method as claimed in any preceding claim, where all features of a common data type in the document are treated as one element.

9. A method as claimed in any of claims 1 to 7, where spatially distinct features of a common data type in the document are treated as separate elements.

10. A method as claimed in any preceding claim, wherein elements are user selectable or deselectable for the step of similarity searching.

11. A method as claimed in any preceding claim, wherein the similarity searching results for separate elements are weighted before combination.

12. A method as claimed in claim 11, wherein said weighting is user selected.

13. A method as claimed in claim 11, wherein said weighting is attributed according to a determined significance of each relevant element in the document.

14. A method of searching a database to find documents similar to a query document, comprising:

decomposing the query document into elements of different data types;

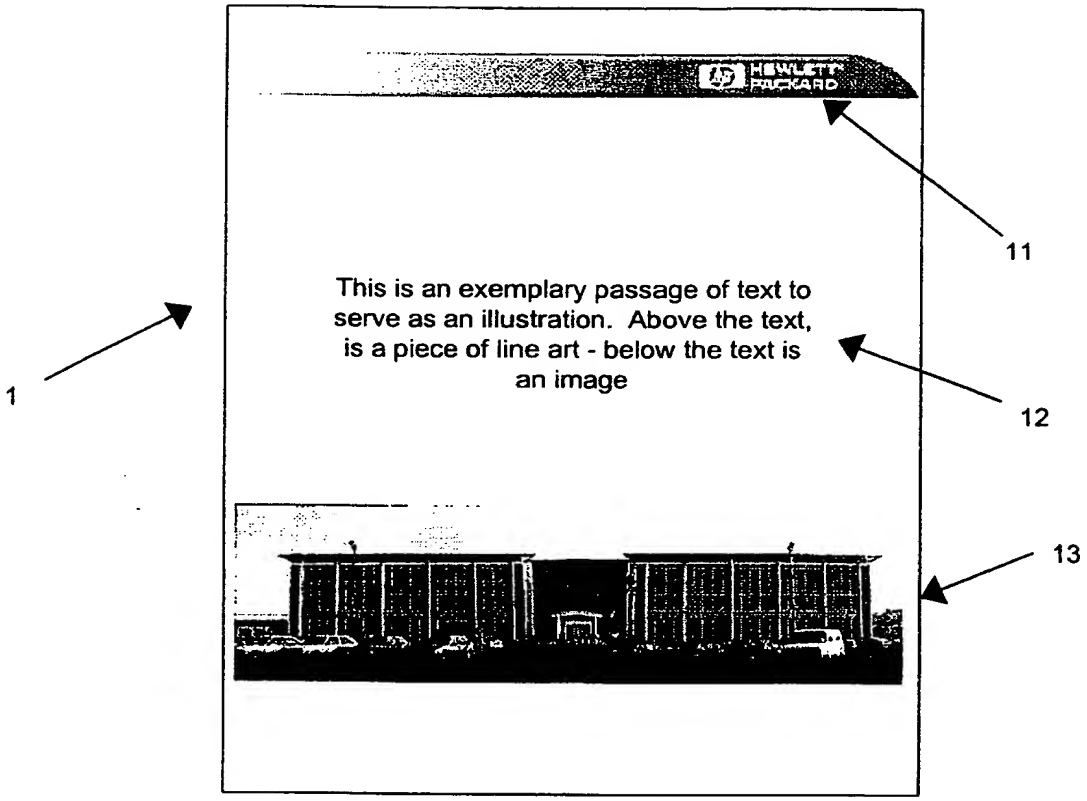
determining a layout element in a layout datatype from the spatial arrangement of the elements in the document;

for the layout element, conducting a layout similarity search to return match results from the database for the layout element.

15. A method as claimed in claim 14, wherein the layout similarity search involves searching against templates representative of different document types.

16. A method as claimed in claim 14, wherein the elements include elements of separate data types representative of different functional blocks of text.

17. A method as claimed in claim 14 or claim 16, wherein the elements include elements of data types representative of images.



This is an exemplary passage of text to serve as an illustration. Above the text, is a piece of line art - below the text is an image

Figure 1

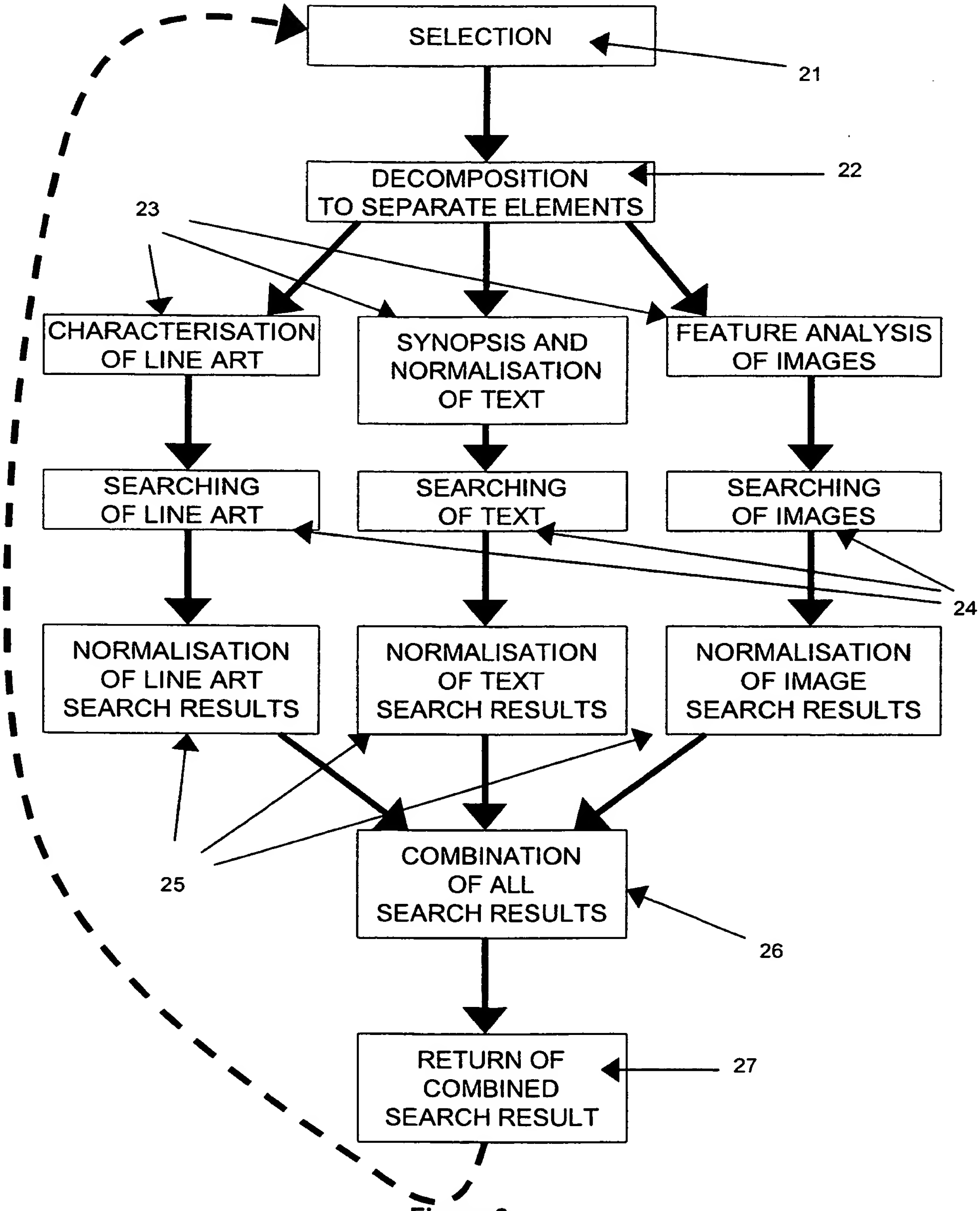
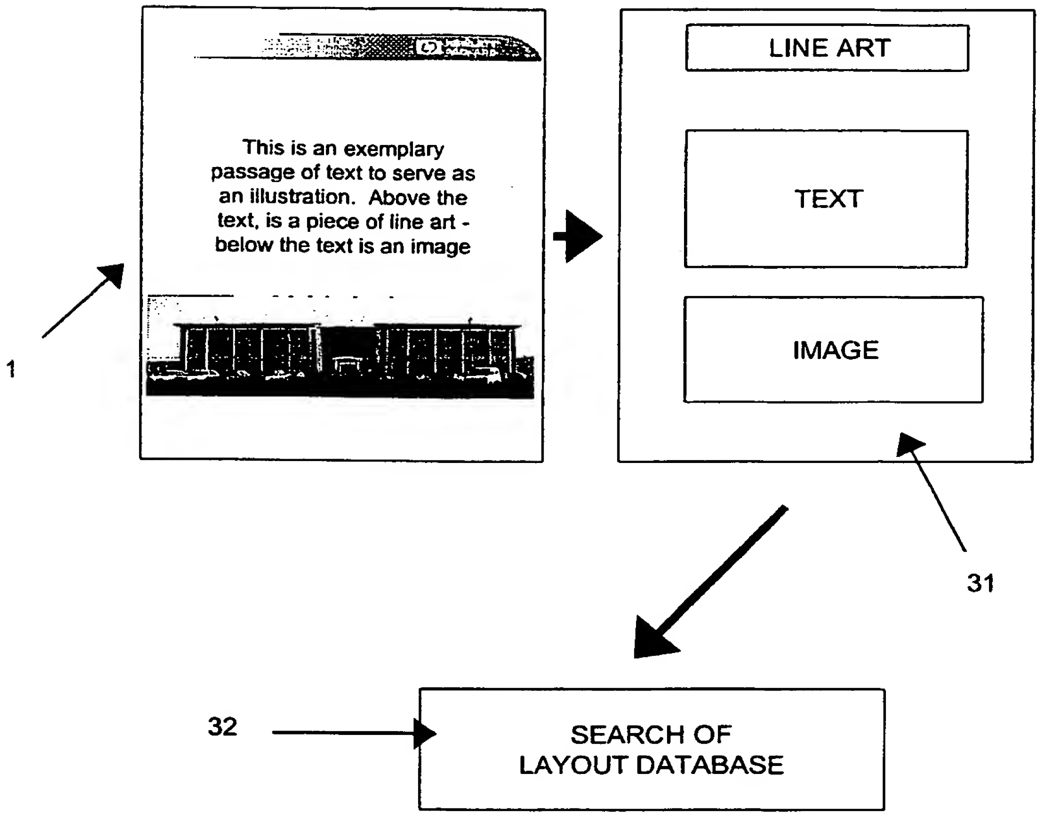

SELECTION
21
DECOMPOSITION TO SEPARATE ELEMENTS
22
23
CHARACTERISATION OF LINE ART
SYNOPSIS AND NORMALISATION OF TEXT
FEATURE ANALYSIS OF IMAGES
SEARCHING OF LINE ART
SEARCHING OF TEXT
SEARCHING OF IMAGES
24
NORMALISATION OF LINE ART SEARCH RESULTS
NORMALISATION OF TEXT SEARCH RESULTS
NORMALISATION OF IMAGE SEARCH RESULTS
25
COMBINATION OF ALL SEARCH RESULTS
26
RETURN OF COMBINED SEARCH RESULT
27

Figure 2



This is an exemplary passage of text to serve as an illustration. Above the text, is a piece of line art - below the text is an image

Figure 3

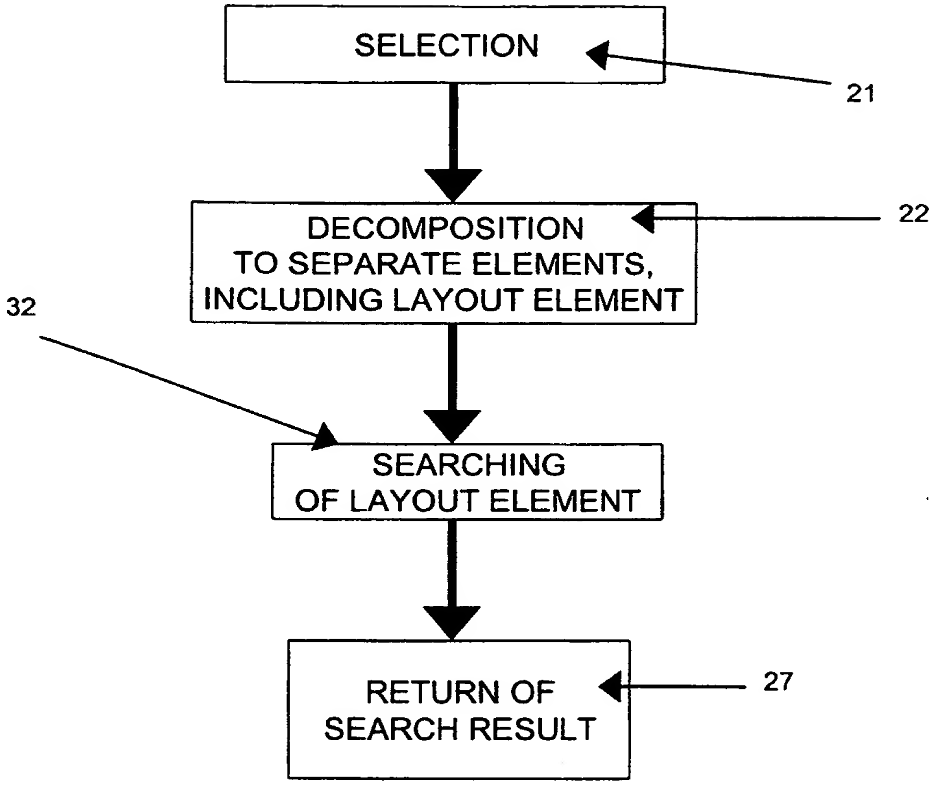

SELECTION
21
DECOMPOSITION TO SEPARATE ELEMENTS, INCLUDING LAYOUT ELEMENT
22
32
SEARCHING OF LAYOUT ELEMENT
RETURN OF SEARCH RESULT
27

Figure 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00489

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 08 265 A (RICOH KK) 4 September 1997 (1997-09-04) column 1, line 49 - line 56 column 2, line 8 - line 11 column 2, line 51 - line 61 column 5, line 15 - line 56 figures 3,4 ---	1-6, 14-17

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search 14 June 2000	Date of mailing of the international search report 03/07/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Triest, J

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00489

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	MUKHERJEA S ET AL: "Towards a multimedia World-Wide Web information retrieval engine" COMPUTER NETWORKS AND ISDN SYSTEMS,NL,NORTH HOLLAND PUBLISHING. AMSTERDAM, vol. 29, no. 8-13, 1 September 1997 (1997-09-01), pages 1181-1191, XP004095315 ISSN: 0169-7552 column 2, line 12 -column 3, line 3 ---	1,2,4,5
A	HAMANO T: "A SIMILARITY RETRIEVAL METHOD FOR IMAGE DATABASES USING SIMPLE GRAPHICS" PROCEEDINGS OF WORKSHOP ON LANGUAGES FOR AUTOMATION,US,WASHINGTON, IEEE COMP. SOC. PRESS, vol. -, 1988, pages 149-154, XP000118740 ISBN: 0-8186-0890-0 page 150, column 2, paragraph 4 -page 151, column 1, paragraph 3 -----	14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/00489

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19708265 A	04-09-1997	US 5933823 A	03-08-1999
		CN 1170168 A	14-01-1998
		JP 9237282 A	09-09-1997